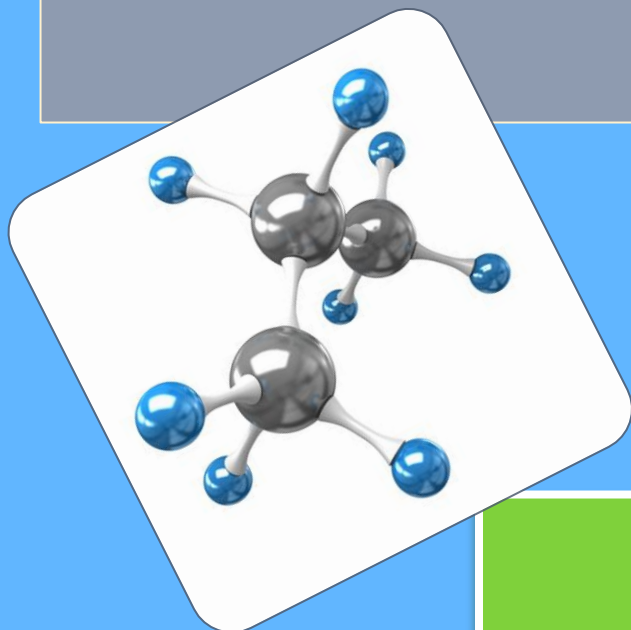


# Organic Chemistry

## Grade 12: SCH4U



**Chemistry Content Unit Assignment**

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# Today's Agenda

1. Big Ideas
2. Overall Expectations
3. Guiding & Essential Questions
4. Connection to Other Units
5. Monthly Plan
6. **Minds On: Organic Molecule Mystery!**
7. **Activity: Organic Chemistry Jigsaw!**
8. Misconceptions
9. STSE Blog

# What are the Big Ideas?

**1. Organic compounds have predictable chemical and physical properties determined by their respective structures.**

**2. Organic chemical reactions and their applications have significant implications for society, human health and the environment.**

# Overall Expectations:

- **B1. (STSE):** Assess the social and environmental impact of organic compounds used in everyday life and propose a course of act to reduce use of these compounds
- **B2. (Investigation/Communication):** Investigate organic compounds and their chemical reactions and use different ways to represent compounds
- **B3. (Basic Concepts):** Demonstrate understanding of structures, properties and chemical behaviours of different classes of organic compounds

# Guiding Questions:

1. **What** are the different classes of organic compounds and how do they differ in structure and properties?
2. **How** do these differences in structure and properties affect how these compounds react in chemical reactions?
3. **How** does the use of these organic compounds impact our society and the environment?

## **ESSENTIAL QUESTION:**

- How do the structural and chemical properties of different organic compounds interact with one another to impact our society and environment?

# Connection to Other Units

**When should we teach the Organic Chemistry unit?**

- 1. Start of semester (prior knowledge from Grade 11)**
- 2. After the 'Structure and Properties of Matter' Unit**

**...What prior knowledge will students have?**

# Connection to Other Units...

## **Option 1:** Organic Chemistry at start of semester...

### Gr.11: Matter, Chemical Trends and Chemical Bonding

- Every element/compounds have predictable chemical and physical properties due to nature of structure and type of bonds

## **Option 2:** After 'Structure and Properties of Matter'

- Understanding of **molecule shapes** (VSEPR), **polarity**, **bond types**, **electron configurations** (Pauli Exclusions, Hund's Rule)
- Understanding of how atomic structure and chemical bonding affect physical properties of ionic, molecular, covalent network and metallic substances

# Monthly Plan:

Monday	Tuesday	Wednesday	Thursday	Friday
<b>1) Intro to Hydrocarbons</b>  <i>AAL, AFL</i>	<b>2) (cont'd) Hydrocarbons</b>  <i>AAL, AFL</i>	<b>3) Organic Halides, Alcohols, Ethers</b>  <i>AFL, AAL</i>	<b>4) Aldehydes, Ketones, Carboxylic Acids</b>  <i>AAL, AFL</i>	<b>5) Ester, Amines, Amides</b>  <i>AAL, AFL</i>
<b>6) Naming &amp; Structures Quiz Review</b>  <i>AFL, AAL</i>	<b>7) Naming &amp; Structures Quiz &amp; Lab 1 Prep</b>  <i>AOL, AFL, AAL</i>	<b>8) Lab 1: Physical &amp; Chemical Properties</b>  <i>AFL, AAL</i>	<b>9) Organic Halides, Alcohols, Ether Reactions</b>  <i>AAL, AFL</i>	<b>10) Aldehydes, Ketones Reactions</b>  <i>AAL, AFL</i>
<b>11) Carboxylic Acid, Ester Reactions</b>  <i>AAL, AFL</i>	<b>12) Amines, Amides Reactions</b>  <i>AAL, AFL</i>	<b>13) Addition, Condensation, Polymerization Reactions</b>  <i>AAL, AFL</i>	<b>14) Lab #2: Polymer Lab</b>  <i>AFL, AAL</i>	<b>15) Isomers + Reactions Quiz Review</b>  <i>AFL, AAL</i>
<b>16) Reactions Quiz</b>  <i>AOL, AAL, AFL</i>	<b>17) Biological Molecules/ Reactions</b>  <i>AAL, AFL</i>	<b>18) Mechanisms</b>  <i>AAL, AFL</i>	<b>19) Unit Review</b>  <i>AAL, AFL</i>	<b>20) Unit Test</b>  <i>AOL</i>



# Minds On!

## Mystery Organic Molecule

Students will “build” molecules from the different classes of organic compounds in a fun and hands-on way using **MARSHMALLOWS!**

**Purpose:** To become familiar with the unique structures of different classes of organic compounds



# Method:

- Arrange bags with the exact number of marshmallows (atoms) and toothpicks (bonds) to construct the compounds
- Each group of 3-4 students will get a different bag, instructions and discussion questions.
- After 10 minutes, groups will select a presenter to share their compound, process, and answers with the class.

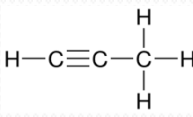

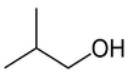
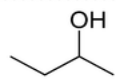
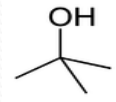
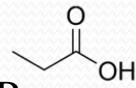
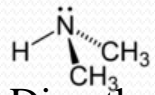
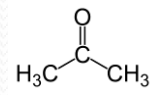
# Instructions to Students:

*In this bag, you have exactly enough marshmallows (atoms) to construct a compound from this class of organic compounds: **alkyne / alcohol / carboxylic acid / secondary amine / ketone**. You must use ALL marshmallows.*

*Please answer the following questions:*

- *1. What is the proper IUPAC name for your compound?*
- *2. What are the isomers that can exist for the same chemical formula, or is this the only way that this chemical formula can be represented?*
- *3. What is the general formula for this class of compounds?*
- *4. What are the major applications of this class of compounds in society?*

# Answer Chart:

BAG #1	BAG #2	BAG #3	BAG #4	BAG #5
 <p>Propyne <math>C_3H_4</math></p>	<p><b>Butanol</b>- any of the four <b>isomeric alcohols</b> of formula <math>C_4H_9OH</math>:</p> <p><b><u>n</u>-Butanol</b>, 1-butanol </p> <p><b><u>I</u>sobutanol</b> </p> <p><b><u>sec</u>-Butanol</b>, 2-butanol </p> <p><b><u>tert</u>-Butanol</b>, 2-methylpropan-2-ol </p>	 <p>Propanoic acid</p> <p><b><u>CH</u><sub>3</sub>CH<sub>2</sub><u>CO</u>OH</b></p>	 <p>Dimethylamine</p> <p><b>(CH<sub>3</sub>)<sub>2</sub>NH</b></p>	 <p>Propanone or acetone <math>C_3H_6O</math></p>
$C_nH_{2n-2}$ Alkyne	$C_nH_{(2n+1)}OH$ Alcohol	$C_nH_{2n+1}COOH$ Carboxylic Acid	$C_nH_{2n+1}NH$ 2° Amine	$C_nH_{2n}O$ Ketone
Naturally occurring gasoline, oil sands in Alberta	Beverages, solvents, antiseptic	Food (acetic acid), production of polymers, solvents, food additives	Dyes; drugs designed to mimic/interfere with the action of natural amine neurotransmitters	Solvents, polymer precursors, pharmaceuticals



# Organic Chemistry Jigsaw

# Instructions:

- Get into a group of 4 or 5. This will be your HOME Group.
- Everybody pick an organic compound from the bag at your table.
- On the reverse side, draw the structural formula for your organic compound.
- Using your drawing and without talking, find others in the class with the same functional group and find a table.



# Organic Chemistry Jigsaw

- Using the large sheets and markers at each table, create a concept map of your organic compound.
- Draw and write down everything that needs to your type of organic classification.
- There are some general information that must include attached to large sheets.
- Your group has 15 minutes.

# Concept Map

- Make sure everyone in the group understands all the information that was written because you will do a mini presentation to your HOME group.
- You have an additional 5 minutes ask your group members questions.
- Tape your poster up on the wall away from everyone else. (Keep your model near by)
- Go back to your HOME group.





# Home Group Presentations

- We will rotate clockwise and the specialist in each group will give up to 5 minutes to present on the material.
- Students will be given time to take notes during and after the presentation.

# Misconceptions

- Why are alkenes double bonds **more reactive** even though they are **stronger** than single bonds?
- How does the delocalization of p-electrons in the benzene ring make it more stable than expected?
- In determining the presence of chiral carbon atoms, look for carbon atoms that are bonded to four different atoms.
- A molecule is considered to be optically active and capable of displaying optical isomerism if it contains at least one chiral carbon atom.

# STSE Blog

## **GIZMO:**

### **Chemistry Tutor Cybercon: "Rumble Bling Bling Wave"**

- Posts will help with chemistry homework and STSE blog items on a public Facebook wall
- **Important Note:** Students do \*NOT\* need to friend Rumble to read and contribute to the wall (maintains buffer of non-invasiveness whereby teacher does not have access to the personal Facebook page information of the students)

**Facebook Name:** Rbb Wave

**Twitter:** @RumbleBBWave

**E-Mail:** rbbwave@gmail.com

**Link:** <http://www.facebook.com/profile.php?id=100003373686314&sk=wall>

# STSE Blog (...cont'd)

- **Each student must complete a weekly blog entry:**
- **Choose a commonly used organic molecule that was discussed in class this week:**
  - ✓ Use ChemSketch<sup>®</sup> to draw this molecule.
  - ✓ *What is its practical use in our society?*
  - ✓ *Are there any societal, health or environmental implications for the use of this product?*
  - ✓ *If so, list what these implications are and suggest what could be done instead?*



**THANKS FOR LISTENING!**

QUESTIONS or  
COMMENTS?